Vol. 106 No. 2 January 25, 1947

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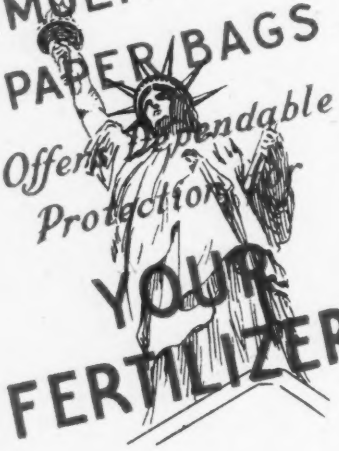

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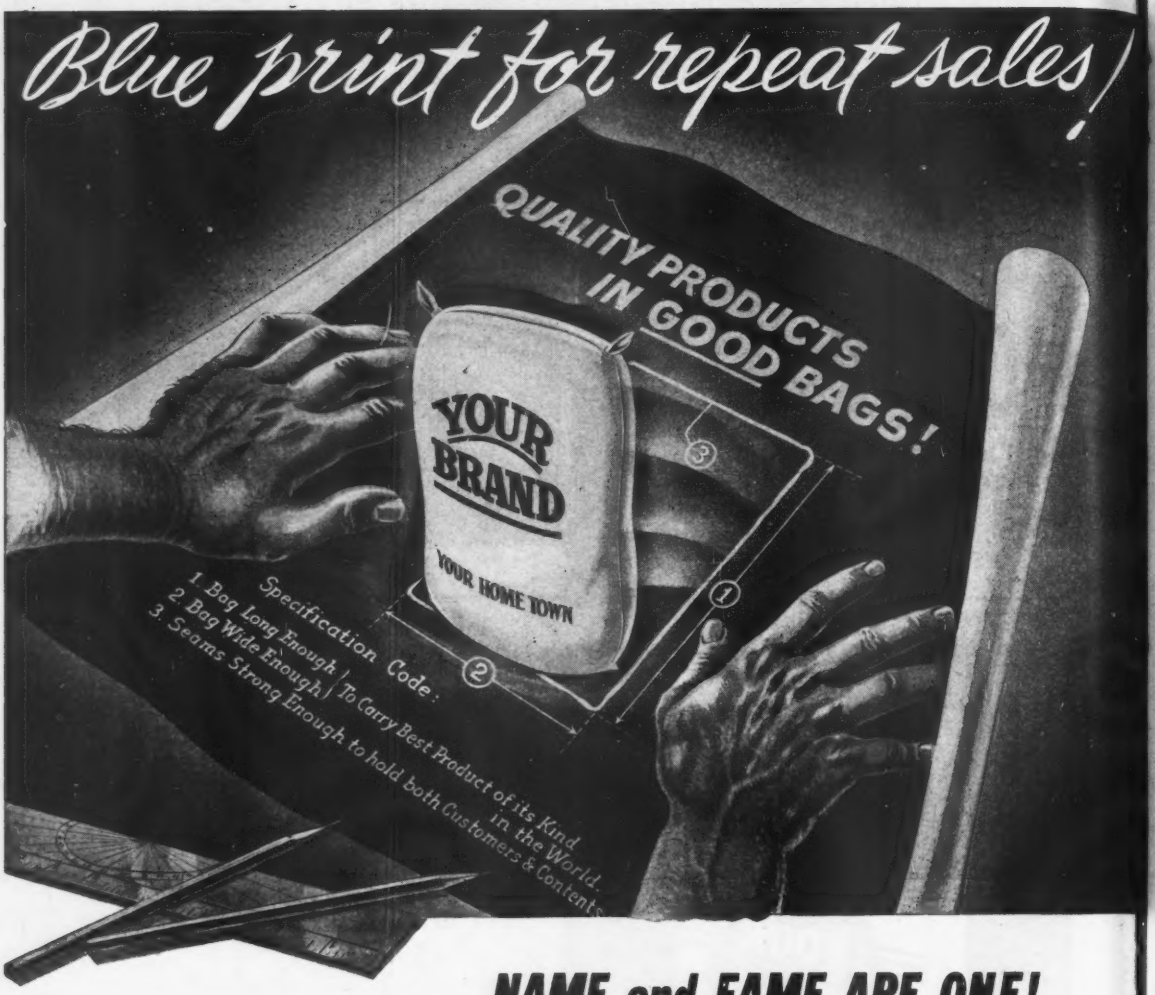
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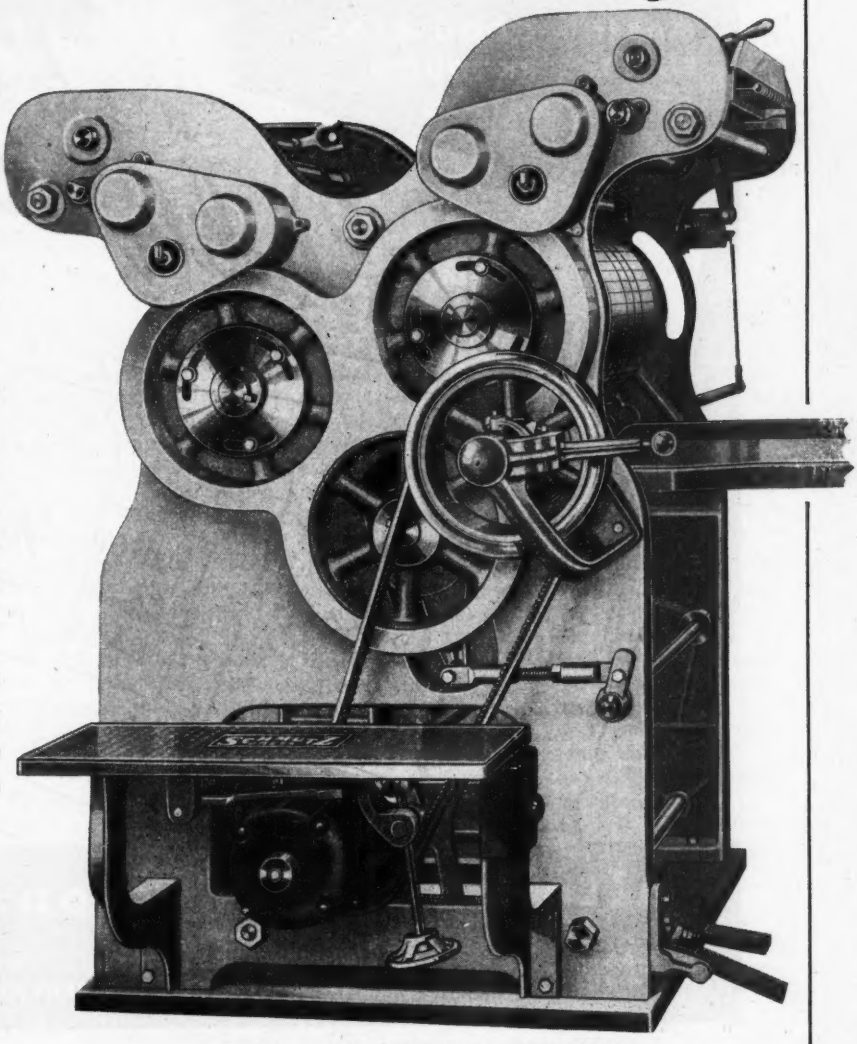

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The American FERTILIZER

Vol. 106 JANUARY 25, 1947 No. 2

Trends in Use of Major Plant Foods*

By M. H. LOCKWOOD

President, National Fertilizer Association, Washington, D. C.

AS AGRICULTURE ages and intensifies, the ratio of phosphorus to nitrogen and potash, in applied fertilizers, narrows. For the United States, nitrogen has increased from 20 to 24 per cent of the three major nutrients during the twenty-four years following 1920. During the same period, phosphoric acid decreased from 58 per cent of the total to 51, and potash has increased from 22 to 25 per cent.

For commercial distribution only, these trends are even more evident, for government distribution has been principally phosphatic. (See Table I, both sections.)

New areas of extensive agriculture usually begin fertilizer use with phosphates, and progress toward the three-factor ratios. Increasing rates of application as well as narrowing ratios of nitrogen and potash to phosphoric acid occur as (a) time passes and, (2) agriculture grows more intensive and, (3) returns per acre increase. In some instances, area of heavy repeated fertilizer use accumulate substantial reserves of available phosphoric acid. Decreases in prices of nitrogen and potash have also been important factors in increasing their use. Prices for phosphates have declined little during the past twenty years.

The national trend upward in nitrogen ratio is masked somewhat by the increasing proportion of our national volume used in the grain-growing areas where a low ratio of nitrogen to minerals is customary. Such areas have clung for years to such grades as 2–12–6 commonly applied at low rates per acre. Fortunately, leaders among both agronomists and industry are courageously converting such practices to narrower ratios and heavier rates more easily defended under today's conditions and knowledge.

Improved methods of application have played no small part in greater fertilizer use. With both "starter" or "beside the row" application and the newer "plow down" or "heavy" application methods, nitrogen and potash are wisely placed where they may work more efficiently. Fortunately, too, the salt index of nitrogen and potash carriers used has decreased as higher analysis materials have increased in use. The decreased use of low analysis potash salts is one of the best illustrations of this as well as the effect of lower unit costs for higher analysis ingredients.

Trends in Regions

Because grand averages for the nation may have in them the confusing effect of unlike area practice, let's take a look at a few different sections of the country.

The historically fertilizer-using state of North Carolina is a convenient place in the Southeast for a beginning. In the ten years

*Reprinted from *Better Crops with Plant Food*, Washington, D. C.

since 1935, the popular 3–8–3 has been replaced by 3–8–5 and 3–9–6, as well as 4–10–6 grades. Such a trend seems constructive from the point of view of displacement of grades unduly dilute. While this change was aided in recent years by state and federal regulations, material progress is shrinking the volume of dilute grades was effected earlier by constructive educational effort. North Carolina authorities credit much of that State's progress from a 15-unit 1937 record to 18.8 units in 1944–1945 to regulatory control. They also state that heavy accumulations of phosphoric acid in some soils indicate a need for lower applications of that nutrient for more economic fertilization under some conditions in that state. I do not agree that progress by mandatory grade limitations is an acceptable substitute for voluntary educational methods. I do recommend that industry follow such findings as the evidence supporting lower phosphate applications such as the North Carolina Station suggested.

During the past two years, numerous North Carolina demonstrations of corn fertilization have indicated the practicability of doubling the yield of that crop with heavier fertilizer use including all three of the major plant nutrients but with emphasis on nitrogen. Cummings and Collins estimate that 50,000 tons of additional nitrogen will be required to accomplish this doubling feat on corn yields. Pasture improvement now well started in North Carolina will require substantial quantities of phosphates and potash as well as lime.

In Florida, Dr. A. F. Camp and his associates working closely with the fertilizer industry have done a spectacular job in stepping up the citrus yield and quality by proving that minor elements were needed to more than triple the grapefruit and orange volume as has been done during the past decade. Here is a case where nitrogen, phosphorus, and potash were not the first limiting factors, even though important. Magnesium, manganese, copper, zinc, and sometimes boron and iron have their place in the Florida citrus fertilizer program.

The South Atlantic Coastal States (Table II), Florida to Virginia, inclusive, increased in potash ratio during the 1920 to 1940 period from 21 to 29 per cent, and decreased during the same period in phosphoric acid ratio from 61 to 43 per cent. At the same time, the nitrogen ratio in those five states gained from 18 to 28 per cent of the total for the three major nutrients.

In Alabama, the promotion of the 6–8–4 grade in place of lower nitrogen ratios is well known. The record of this trend appears to have been submerged, however (when we

TABLE I

SECTION 1—TRENDS IN PLANT NUTRIENT USE, UNITED STATES COMMERCIAL DISTRIBUTION

Factor	1920	1925	1930	1935	1940	1944
Nitrogen	3.12	3.66	4.47	4.77	5.13	5.38
Phosphoric Acid	9.05	9.12	9.41	9.13	9.21	9.84
Potash	3.53	3.79	4.20	4.70	5.33	5.55
Total	15.70	16.57	18.08	18.60	19.86	20.77

INDEX

Factor	1920	1925	1930	1935	1940	1944
Nitrogen	20	22	25	26	26	26
Phosphoric Acid	58	55	52	49	47	47
Potash	22	23	23	25	27	27
Total	100	100	100	100	100	100

SECTION 2—ALL DISTRIBUTION, INCLUDING GOVERNMENT

Factor	1920	1925	1930	1935	1940	1944
Nitrogen	3.12	3.66	4.47	4.77	4.85	5.02
Phosphoric Acid	9.05	9.12	9.41	9.13	10.57	10.47
Potash	3.53	3.79	4.20	4.70	5.05	5.15
Total	15.70	16.57	18.08	18.60	20.47	20.64

INDEX

Factor	1920	1925	1930	1935	1940	1944
Nitrogen	20	22	25	26	24	24
Phosphoric Acid	58	55	52	49	52	51
Potash	22	23	23	25	24	25
Total	100	100	100	100	100	100

study Table III), possibly by government distributed phosphate used on crops other than cotton.

California is notably a heavy user of nitrogen but finds that with two to three times the quantity of nitrogen as is used in Florida, the quality of California citrus is declining. Indications from field tests in California point toward minerals as being needed with nitrogen. From 1920 to 1943, the nitrogen used in the three west coast states increased from 28 to 50 per cent of the three major nutrients, while phosphoric acid decreased from 53 to 35 per cent, and potash increased from 19 in 1920 to 30 per cent in 1930, dropping back to 15 per cent by 1943.

The Northeast (Table IV) has narrowed its ratio of phosphoric acid to nitrogen and potash during the past quarter century. In that area of three-century farmed land, there is still room, however, for much more phosphate to be used with farm manures before reasonable efficiency in the use of those manures will be attained. Table IV does not indicate much change in the Northeast, however, during the past ten years.

In our area survey of the nation, we may well end in the grain belt, livestock-legume states of the Midwest where recent years have witnessed rapid increases in fertilizer use matched by no other section (Table V).

The ratio of nutrients in the Midwest is so near 1–6–3, except as the shortage of nitrogen depressed that factor in 1942 and 1943, that the predominance of the 2–12–6 grade is evident. As soon as an improved balance of supply and demand develops, the ratio of nitrogen and potash should increase in that that area. Such a development need not depress the volume of phosphates used, for still greater fertilizer use may be expected in the corn belt. In spite of the fact that 1944 fertilizer consumption in the Midwest reached two and one-half times the 1935–1939 average, certainly nitrogen and potash and perhaps even phosphoric acid were insufficient in quantity to satisfy the rapidly growing demand there.

In a legume-livestock section such as the Midwest, the production of legumes lessens the purchased nitrogen needed and tends to increase the potash requirement. Even so, with deep placement of heavier applications of nitrogen, in which some states in the Midwest have already made substantial beginnings, there is the likelihood that the present low ratio of nitrogen to minerals may be narrowed. During the years 1943–1944, there obviously was less potash available for use in comercial fertilizers in the Midwest than would have readily been purchased, even though special allocations were made favoring that area as against other sections of the

TABLE II

SOUTHEASTERN TREND

(Virginia, North Carolina, South Carolina, Georgia, and Florida)

Factor	1920	1930	1940	1943
Nitrogen	18	18	28	24
Phosphoric Acid	61	56	43	45
Potash	21	26	29	31
Total	100	100	100	100

TABLE III

ALABAMA

Period	Ratio of Major Nutrients: Nitrogen	Phosphoric Acid	Potash	Total Nutrient Quantity Trend
1935–1939 Average	31	46	23	100
1940	30	49	21	119
1941	32	48	20	121
1942	25	55	20	126
1943	24	55	21	156
1944	29	52	19	162

TABLE IV

NORTHEAST—NEW ENGLAND AND MIDDLE ATLANTIC

Period	Ratio of Major Nutrients: Nitrogen	Phosphoric Acid	Potash	Total Nutrient Quantity Trend
1935–1939 Average	17	54	29	100
1940	15	59	26	116
1941	14	60	26	134
1942	13	58	29	140
1943	14	56	30	148
1944	17	55	28	67

TABLE V

EAST AND WEST NORTH CENTRAL STATES

Period	Ratio of Major Nutrients: Nitrogen	Phosphoric Acid	Potash	Total Nutrient Quantity Trend
1935–1939 Average	10	62	28	100
1940	9	61	30	130
1941	9	61	30	149
1942	5	63	32	201
1943	7	63	30	213
1944	9	61	30	253
Compare the above with the Continental United States Trends below.				
1935–1939 Average	24	50	26	100
1940	23	53	24	120
1941	23	53	24	132
1942	19	55	26	145
1943	20	53	27	168
1944	24	51	25	179

nation. Increased use of fertilizers in the Midwest will affect the national trend more as the area volume grows. (See also Tables XI and XII.) Anyone who likes to play with figures can have a lot of fun as well as dig out much of value using the tables in U. S. D. A. Plant Food Memorandum Report No. 11, and A. L. Mehring's article in the August, 1945 issue of the *Journal of the American Society of Agronomy*, studying the trends in states, regions, and the nation.

Trends in Mixtures and Materials

A. L. Mehring of the U. S. Department of Agriculture, discussing "Fertilizer Nitrogen Consumption" in the March, 1945, issue of *Industrial and Engineering Chemistry*, shows that in the period from 1925 to 1940, nitrogen purchased in mixtures increased from 45 to 49 per cent of the total while nitrogen distributed unmixed decreased conversely. (See Table VI.) Table VI of Mehring's article incidates that (1) natural organics decreased from 25 to 12 per cent of the fertilizer nitrogen supply, (2) while ammonia and its solutions increased from 0 to 13 per cent during the same 15-year period. In mixtures for the same period, solid nitrates decreased from 10 to 5 per cent of the nitrogen total, while solid ammonium salts increased from 13 to 20 per cent of that total.

Let's see how, for the same 15-year interval, the nitrogen used in fertilizers changed in form (Table VI).

Obviously, the trend is away from natural organics and solid nitrates toward the lower priced solid ammonium salts, synthetic organics, and ammonia and its solutions.

Superphosphate production, as well as capacity, has undergone less change in volume, methods, location, or type than either nitrogen or potash during the past quarter century. Excess capacity exists mainly in the Southeast, while the Midwest and West Coast are deficit areas. Recent construction of processing facilities in deficit areas indicates, however, that as the post-war adjustment progresses, we shall find new capacity locating soundly to serve new demand of permanence. We will also experience some growth of high-analysis phosphate production, with its inherently greater shipping radius tending to locate new facilities near sources of raw materials and low cost power,

(Continued on page 26)

TABLE VI

SECTION 1—NITROGEN IN MIXED FERTILIZERS

Form	1925	1940
Solid Nitrates	23	10
Solid Ammonium Salts	20	41
Natural Organics	37	15
Synthetic Organics	11	9
Ammonia and Its Solutions	0	25
Total	100%	100%

SECTION 2—NITROGEN TOTAL—MIXTURES AND MATERIALS

Form	1925	1940
Solid Nitrates	39	32
Solid Ammonium Salts	31	35
Natural Organics	25	12
Synthetic Organics	5	8
Ammonia and Its Solution	0	13
Total	100%	100%

TABLE VII

SECTION 1—SUPERPHOSPHAYE PRODUCING CAPACITY (UNITED STATES)

Year	Ordinary Superphosphate		High Analysis Superphosphate		Total Tons of P_2O_5
	Tons P_2O_5	% of Total	Tons P_2O_5	% of Total	
1920	1,440,000	99½%	7,000	½%	1,447,000
1930	1,600,000	97%	44,000	3%	1,644,000
1940	1,528,000	89%	180,000[1]	11%	1,708,000
1944	1,667,000	85%	287,000[1]	15%	1,954,000

[1] Includes Tennessee Valley Authority Capacity.

SECTION 2—SUPERPHOSPHATE PRODUCTION—UNITED STATES

Year	Ordinary Superphosphate		High Analysis Superphosphate		Total Tons of P_2O_5
	Tons P_2O_5	% of Total	Tons P_2O_5	% of Total	
1929	710,700	95%	34,900	5%	745,600
1934	477,500	94%	31,300	6%	508,800
1939	632,600	83%	125,500	17%	758,100
1944	1,219,500	91%	124,900[1]	9%	1,344,400

[1] The production of two large plants was largely diverted to war uses in 1944.

1946 Fertilizer Tax Sales Reach New High

On the basis of fertilizer tax tag sales, an all-time high in the volume of fertilizer consumption seems to have been reached in 1946. Fertilizer tag sales for the year just ended totaled 9,276,000 equivalent short tons; this represented an increase of 18 per cent over sales in 1945, and 92 per cent over the 1935–1939 average, according to The National Fertilization Association. Since 1936, the volume of tag sales, in equivalent tons, has increased each year, except for a slight drop in 1938, to the new high level of 1946. The tonnage for the 16 reporting States in 1946 was greater than the total United States fertilizer consumption for any year through 1941. Each of the 16 States that require tax tags showed an increase in 1946 sales over 1945 sales; the States with the greatest percentage increases were Oklahoma, Missouri and Texas.

New Peak Indicated for Fertilizer Consumption

The relation of tax tag sales to total United States fertilizer consumption was approximately the same in 1945 as in 1944. Tag sales in 1945 increased almost 9 per cent over 1944 sales and the total U. S. fertilizer consumption for 1945 was 9.5 per cent above that for 1944. If this relationship continued through 1946 the total fertilizer consumption

(Continued on page 24)

FERTILIZER TAX TAG SALES

State	December				July–December		
	1946 Tons	1945 Tons	1944 Tons	% of 1945	1946 Tons	1945 Tons	1944 Tons
Virginia	51,767	25,952	40,453	116	239,741	207,367	186,632
North Carolina	226,453	179,966	143,379	144	526,434	364,631	319,090
South Carolina	100,150	63,465	88,390	172	290,107	168,850	180,960
Georgia	83,363	57,720	68,110	102	231,837	227,739	201,231
Florida	90,391	91,478	80,246	116	542,120	466,700	371,989
Alabama	81,400	36,650	54,050	188	220,900	117,200	130,300
Tennessee	13,026	3,500	11,475	186	101,610	54,681	73,054
Arkansas	22,900	12,500	9,500	192	54,700	28,500	33,100
Louisiana	12,480	15,550	4,800	113	127,957	113,224	83,365
Texas	46,029	14,630	10,885	205	171,860	83,743	69,133
Oklahoma	5,807	760	607	328	28,445	8,660	9,557
Total, South	733,766	502,171	511,895	138	2,535,711	1,841,295	1,658,411
Indiana	116,436	60,098	50,271	122	391,633	319,806	269, 592
Illinois	23,400	25,850	22,425	127	146,095	114,825	89,085
Kentucky	23,825	11,338	8,382	154	98,520	63,951	64,034
Missouri	28,568	12,620	11,418	173	120,978	70,026	71,335
Kansas	2,485	525	750	259	43,126	17,280	15,020
Total, Midwest	194,714	110,431	93,246	137	800,332	585,888	509,066
Grand Total	928,480	612,602	605,141	137	3,336,063	2,427,183	2,167,477

MONTHLY FERTILIZER TAX TAG SALES

Compiled by The National Fertilizer Association
(Short Tons)

Month	11 Southern States			5 Midwestern States		
	1946	1945	1944	1946	1945	1944
January	1,086,635	1,110,772	1,028,481	257,580	149,988	123,819
February	1,278,412	1,020,279	1,085,970	134,012	140,250	131,579
March	1,316,193	1,258,894	1,151,500	143,783	105,796	106,976
April	747,498	780,600	659,322	148,798	130,179	83,408
May	405,107	390,709	357,584	114,659	90,375	78,249
June	241,889	162,083	125,813	65,750	83,136	64,033
July	208,319	140,239	82,499	159,218	103,430	83,458
August	223,275	175,174	135,490	143,910	126,494	122,384
September	400,977	289,396	271,281	158,323	85,948	72,628
October	521,725	377,537	230,460	62,669	56,919	28,405
November	447,649	356,778	426,786	81,518	102,666	108,945
December	733,766	502,171	511,895	194,714	110,431	93,246
Total	7,611,445	6,564,632	6,067,081	1,664,934	1,285,612	1,097,130

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Lemke Again Introduces Federal Fertilizer Control Bill

On January 13th, Representative William Lemke, of South Dakota, which State used only about 500 tons of fertilizer in 1945, introduced into Congress a bill, H. R. 869 (referred to the Committee on Agriculture), which, as to fertilizers and fertilizer materials shipped in interstate commerce:

1. Would require a license from the Secretary or Agriculture, at a fee of $10 for each brand of analysis, expiring December 31: and the paym nt of 10 cents a ton (through the purchase of tags) as an inspection fee.

2. Would require each package to disclose: (a) net weight in pounds; (b) brand name and trade mark; (c) name and address of manufacturer or importer; (d) guaranteed analysis, giving minimum percentage of available nitrogen, maximum percentage of water soluble nitrogen, minimum percentage of organic nitrogen, minimum percentage of available phosphoric acid, minimum percentage of potash, and maximum percentage of chlorine —the guaranteed analysis of each brand to remain uniform throughout the year and the color and mechanical condition to remain unchanged; (e) total pounds of available plant food and source and number of pounds of filler.

3. Would require that the amount and analysis of each material, or source of each plant food element, used in the manufacture of the fertilizer mixture containing two or more plant food elements be stated, in pounds per 100 pounds of mixture, on an attached tag.

4. Would prohibit shipment of (a) any fertilizer containing any yellow ochre, lamp black, or any other artificial coloring matter or any substsnce supplying an odor not natural to the material used; or (b) any fertilizer containing any pyrites cinders, coal cinders, or any injurious filler; or (c) any fertilizer that contains more than 5/10 of 1 per cent of anhydrous borax or any ammonium sulphocyanide (thiocyanate). Would prohibit shipment of any fertilizer containing pulverized or ground leather, raw, steamed, roasted, or in any other form, or any hair, hoofs, horns, wool waste, or feathers unless there is attached to each fertilizer package a separate tag containing a clear statement that the fertilizer contains so many pounds of such materials.

5. Would impose a penalty of $100 for the first offense and $150 for each subsequent offense upon the sale of (a) any fertilizer or fertilizer material without compliance with the requirement of the bill; or (b) any fertilizer

showing a shortage of 5 per cent of nitrogen or phosphoric acid or potash below the guaranty; and (c) any fertilizer which upon analysis shows a shortage in commercial value of 5 per cent or more below the guaranty.

6. Would authorize the Secretary of Agriculture to employ not more than 25 fertilizer inspectors, at annual salaries of not more than $3,000 plus traveling expenses. The samples drawn by such inspectors would be delivered to the chief chemist of the Department of Agriculture, who after making a complete analysis of the sample would certify such analysis to the Secretary of Agriculture, the record of the analysis to be admissible as evidence in all courts.

This bill is quite similar to the previous bill (H. R. 3775) which Representative Lemke introduced last year into the 79th Congress. This former bill was never reported out of Committee as the uselessness of duplicating the present efficient State inspector service with a Federal service was very forcefully presented. The new Chairman of the Committee on Agriculture, Hon. Clifford R. Hope, should receive all possible information from individual members of the industry as to the effect such a law would have on the specific operation of his particular business.

Fertilizer Prices Remain Low Despite Wage Increases

Average fertilizer prices paid by farmers in 1946 were only 27 per cent above the 1940 level despite an increase of 214 per cent in wage rates in fertilizer plants over the same period, according to Maurice H. Lockwood, President, The National Fertilizer Association.

"Wage rates in fertilizer plants in 1946 were the highest in the history of the industry," Mr. Lockwood stated, "having risen without interruption every year since the before war.

"Fertilizer prices still are at a very favorable level from the farmer's standpoint," said Mr. Lockwood. "Prices received by farmers for their crops in 1946 on the average were approximately 2¼ times as high as in 1935–39. Of course, the prices farmers have had to pay for many commodities they use have risen considerably but low fetrilizer prices coupled high returns for crops have helped to keep farmers in a very desirable economic position.

"High profits from fertilizer use have greatly influenced the demand. Consumption in 1946 doubtless was at a new high total for the ninth successive year and was about twice the 1935–39 average of 7,250,000 tons," said N.F.A's president.

Final 1947 Farm Production Goals Announced

Final farm production goals for 1947 were announced on January 14th by Secretary of Agriculture Clinton P. Anderson. The final goals, calling for a planted acreage of 356,893,000 acres, are about one-third of one per cent under the 358,532,000-acre goal recommended by the Department last November

CROP ACREAGE GOALS—1947

Commodity	Recommended Goal (Nov.) Thousands	Final Goal Thousands
Food Grains and Pulses		
Wheat	71,720	70,700
Rye	2,374	2,374
Rice	1,520	1,520
Dry Beans	2,200	2,150
Dry Peas	478	478
Feed Grains and Forage		
Corn	92,250	91,550
Oats	44,670	44,669
Barley	13,600	13,084
All Sorghums, except sirup	16,000	16,000
Sorghums for Grain[1]	7,500	7,500
Oil and Fiber Crops		
Soybeans for Beans[1]	11,300	11,244
Flaxseed, all	5,000	5,000
Peanuts, Picked and threshed[1]	2,750	2,839
Cotton	23,000	23,100
Sugar Crops		
Sugar Beets	1,069	1,069
Sugarcane, except sirup[1]	327	327
Vegetables		
Potatoes—all	2,670	2,670
Sweet Potatoes	799	803
Truck Crops:		
Fresh[1, 2]	1,985	1,985
Processing[2]	1,953	1,953
Tobacco[1]		
Flue-cured	1,141	1,141
Fire-cured	92.4	92.4
Burley	424.2	424.2
Dark Air-cured	39.4	39.4
Maryland	48.0	50.0
Cigar Leaf	107.7	106.3
Perique	.3	.3
Total Cultivated Crops	297,518	295,369
Hay and Seed Crops[1]		
All Tame Hay	60,600	61,110
Grass and Legume Seeds[3]	6,639	6,515
Cover Crop Seeds[4]	414	414
Total Excluding Grass and Legume Seeds	358,532	356,893

[1] Harvested.
[2] Suggested guides for 22 fresh market vegetables, 10 processing.
[3] Includes alfalfa; red, alsike, ladino, white and sweet clover; lespedeza, timothy, bromegrass, sudan, orchard grass and redtop.
[4] Includes Austrian winter peas, crimson clover, hairy vetch, common and willamette vetch, and common ryegrass.

for review by State U. S. D. A. Councils, but are substantially higher than the 345,111,000 acres planted in 1946 and the pre-war average of 341,605,000 acres planted.

The record output of 1946 crops, the need for greater plantings of flaxseed, and the recommendations by State U. S. D. A. Councils were the principal factors considered in arriving at the final goals. The most significant changes are reductions of 1,020,000 acres for wheat to encourage the needed acreage of flaxseed, an increase of 510,000 acres for tame hay, and reductions of 700,000 acres for corn and 516,000 acres for barley. This relatively small reduction in acreages of the two feed grains appeared desirable when the December crop summary showed that the supply of feed grains per animal unit for the year would likely be the most liberal in history.

"The small changes made in the 1947 goal will make possible a start toward the return to those soil conservation practices needed in sound long-time land use, although we recognize that the 1947 goals do not permit as great a shift in this direction as would be desirable under normal conditions," Secretary Anderson said in announcing the goal.

In view of continuong large requirements for linseed oil, the goal for flaxseed remains at 5 million acres, although some States expressed a desire to reduce their goals from recommended levels. Increased production of the crop is considered necessary, however, and the Department of Agriculture has announced a boost of $2 a bushel above the 1947 support price announced last September. The price support on the 1947 crop now stands at $6 a bushel, U. S. No. 1, Minneapolis basis.

The reduction of a little more than a million acres from the previously announced wheat goal is made to facilitate larger plantings of flax.

November Sulphate of Ammonia

Production of by-product sulphate of ammonium dropped 11 per cent to 59,264 tons during November, according to the U. S. Bureau of Mines. Shipments, however, increased to 69,045 tons and consequently stocks on hand at producers' plants dropped 22 per cent by the end of November, showing 35,389 tons. In addition to the above production, the U. S. Bureau of Census reports an output of 13,011 tons of synthetic sulphate of ammonia during November.

	Sulphate of Ammonia Tons	Ammonia Liquor Tons (NH_3)
Production		
November, 1946	59,294	2,438
October, 1946	66,663	2,318
November, 1945	59,811	2,221
January-November, 1946	586,646	22,783
January-November, 1945	700,815	25,292
Sales		
November, 1946	69,045	2,112
October, 1946	61,834	2,392
November, 1945	56,679	2,138
January-November, 1946	581,483	21,201
January-November, 1945	743,373	23,648
Stocks on Hand		
November 30, 1946	35,389	805
October 31, 1946	45,616	685
November 30, 1945	26,004	852

Bemis Opens New Sales Office

The Brooklyn Sales Division of the Bemis Bro. Bag Co. has announced the opening of a sales office in Pittsburgh, Pa., under the management of Ellis H. Deitrick. The new office is located at 6070–71 Jenkins Arcade, Pittsburgh 22, Pa.

Mr. Deitrick is well acquainted in the important Pittsburgh and surrounding area, having served it for many years under direction of the Bemis Brooklyn office.

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FERTILIZER MATERIALS MARKET

NEW YORK

Demand for Mixed Fertilizers Continues at Record Levels. Export Demand Heavy in Superphosphate and Sulphate of Ammonia. All Nitrogen Supplies Short with Organics Priced Above Fertilizer Range Small Increase in Some Superphosphate Prices. Potash Controls Expected To End in Spring.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, January 20, 1947.

Demand from the agricultural areas for mixed fertilizers is the greatest on record for this time of the season, and all raw materials continue to be moved to the fertilizer manufacturers as soon as produced. Recent figures released by the Department of Commerce and the National Fertilizer Association show that fertilizer consumption for the calendar year 1946 was the greates in the history of the industry. Total tag sales for the year just ended were well over nine million short tons, which figure is an increase of approximately 18 per cent above tag sales during 1945.

The major item of interest to the industry as a whole is the recent announcement from Washington that it has been tentatively decided to remove government controls over the distribution of potash salts as of March 31, 1947. However, it was emphasized that the revoking of the allocation program is due to the general government policy of removing controls as soon as possible, and not because increased supplies of potash are expected.

Foreign inquiry for superphosphate and ammonium sulphate remains heavy, but shortage of these materials prevents the accomplishment of any appreciable export business. There have been no imports of fertilizer materials to be noted during recent weeks.

Sulphate of Ammonia

Present production and imports continue to be far short of meeting current demand, and it appears evident that this market will stay exceedingly tight throughout this fertilizer year.

Nitrate of Soda

Inquiry is exceedingly high for this time of year at the newly established higher price levels for both domestic and imported material. Because of labor difficulties in Chile, imports are considerably behind schedule, but it is anticipated that supplies will be on hand in time to meet spring demand.

Organic Materials

Business in organics continues to be done mainly by the feed trade, with the market on all items remaining very firm and prices holding the recent high levels. Offerings from South America have been in the market on dried blood, tankage and bone meal, but prices asked are still about double buyers' ideas in this country.

Superphosphate

Supplies remain tight in most areas, with all available production under contract. Small advances in price schedule have been made by some producers on normal superphosphate to cover increased production costs. Available supplies of triple superphosphate are still far short of meeting demands from all sections.

Potash

It has been reported by CPA officials that potash supplies during the April/May, 1947 period will be about 25 per cent less than supplies that were available for the same period last year. Producers are being troubled by their inability to obtain equipment for repairs at the mines, but production is generally holding to the high levels expected. Constant demand from fertilizer mixers has made it impossible for producers to build up any stocks of consequence.

CHARLESTON

Heavy Movement of Fertilizers Continues. Vegetable Organics Prices Lower. Car Shortage Hampers Most Shipments.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, January 18, 1947.

Vegetable meals have weakened recently. All other organics remain relatively high for fertilizer use and supplies are fairly scarce. Mineral nitrogen is extremely scarce and the

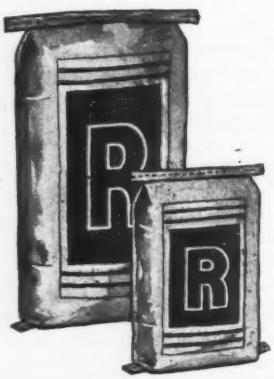
PIRATES are Always on the Alert to Confiscate Merchants' Cargoes

As far back as 400 years ago—when Spanish galleons sailed the Seven Seas with merchants' cargoes—pirates were ever on the lookout for unprotected shipping.

Today modern pirates—**packing and shipping hazards**—are always ready to cause loss or damage to unprotected shipments—shipments packed or shipped in inadequate containers.

In the packing and shipping of powdered, crushed, or granulated materials, handling loss must always be guarded against. Raymond Multi-Wall Paper Shipping Sacks are specially designed to prevent this loss. Their Multi-Wall construction is a constant protection against loss due to snags, tears, and seepage. Made of heavy, specially-prepared Kraft paper, they are sift-proof, dust-proof, and water-resistant.

In the fertilizer industry these tough, strong, dependable Raymond Shipping Sacks completely solve the packing and shipping problem.



THE RAYMOND BAG COMPANY, Middletown, Ohio

Manufacturers of

RAYMOND *Multi-Wall* PAPER SACKS

potash, superphosphate and phosphate rock markets are firm and tight. Mixedfertilizer is moving heavily to consumers in spite of shortages of materials, including all types of bags.

Organics.—The prices on organics in general remain high for fertilizer use. However, the prices of some vegetable meals have weakened recently and cottonseed meal has sold at around $74.00 in bags, f. o. b. mill for 7 per cent and around $74.00 in bulk, f. o. b. mill for 8 per cent meal. Peanut meal has sold for $61.00 for 45 per cent protein grade in bulk, f.o.b. mill.

Castor Pomace.—Producers' prices remain steady with demand strong. Re-sale lots draw higher prices, with few re-sales being made.

Hoof Meal.—Argentine hoof meal has been quoted recently at around $8.25 per unit of ammonia ($10.03 per unit N), c. i. f. Atlantic ports. Domestic sellers ask around $8.75 ($10.63 per unit N), f. o. b. Chicago.

Blood.—Market is rather quiet with prices nominally around $8.00 to $8.50 ($9.72 to $10.33 per unit N), f. o. b. Chicago.

Nitrate of Soda.—With expected supply of soda ash 15 per cent short during 1947 the curtailed production of domestic nitrate of soda is further hampered. Imported nitrate of soda remains behind schedule and the demand is tremendous with supplies critically inadequate to meet the call. Imported has advanced to $41.50 in bags at the ports—bulk is $38.50.

Sulphate of Ammonia.—Demand remains exceedingly strong with supplies tight.

Ammonium Nitrate.—Insufficient to meet the call as the Government program for assisting foreign countries draws off major supplies.

Potash.—Shortage of cars delays shipments and it is also expected that shipments will be 25 per cent off during last quarter of 1947 compared with 1946.

Superphosphate.—Producers are lagging behind in supplying the strong demand as shortage of sulphuric acid and curtailed deliveries of rock hamper production. Market remains tight and probably will continue so through most of 1947.

Phosphate Rock.—Shortage of cars still curtails deliveries to consumers. Demand remains strong from domestic and foreign buyers, making market tight and firm as to price.

PHILADELPHIA

Materials Supply Still Short of Demand. Machinery Repairs Hamper Phosphate Rock Production. Organics Production Limited.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, January 20, 1947.

The strong demand for raw fertilizer materials continues and it is quite evident that there will not be sufficient supply to meet requirements. Attracting considerable attention is the newspaper report that an order of priority was issued last week for a large tonnage of sulphate of ammonia for shipment to Puerto Rico before March 31, 1947—right during the period of greatest demand here at home.

Sulphate of Ammonia.—Current production is increasing, but demand is still far ahead of the ability to supply. Production has been greatly hampered by the recent labor difficulties.

Nitrate of Soda.—Stocks are short and demand continues greater than the supply. Domestic production is cut back by the scarcity of soda ash, while imports are a month or two behind schedule, due to labor difficulties. Market is firm at recently established prices.

Manufacturers' Sales Agents for DOMESTIC

Sulphate of Ammonia

Ammonia Liquor :: Anhydrous Ammonia

HYDROCARBON PRODUCTS CO., INC.

500 Fifth Avenue, New York

Castor Pomace.—The supply is not plentiful and movement is limited.

Blood, Tankage, Bone.—Production has been rather limited, with not very eager buying by the feeding trade, and prices still too high for the average fertilizer man. Sales were reported at prices ranging from $8.00 to 19.50 per unit of ammonia ($9.72 to $11.55 per unit N), with bone meal offerings at $75.00 to $85.00 per ton.

Phosphate Rock.—Demand still continues beyond the ability of the producers to supply. The capacity to produce is seriously reduced because of inability to procure machinery repairs and replacements.

Superphosphate.—Production is limited by the restricted raw rock supply, and acidulators are unable to keep up with the demand. No new business is being solicited.

Potash.—While there is talk of possible relinquishment of Government control, movement is still according to allocation with strong demand for additional tonnage over allotments. No resale is being offered. Producers are working to full capacity of their overworked equipment. Russia is said to be in position to ship sizable quantities of potash, but prices seem to be very much above buyers' ideas.

CHICAGO

No New Developments in Organics Market. Little Material Being Offered.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, January 17, 1947.

Nothing new has developed, or is soon likely to, in the Western organic market. Without offerings the situation continues normal at in the neighborhood of $6.00 ($7.30 per unit N) f. o. b. shipping point.

While many buyers are anxious for tankage there is no producer making offerings at this time.

In the feed market, crushed wet rendered tankage, 11 to 12 per cent ammonia, is held at $7.50 to $8.00 per unit ammonia ($9.12 to $9.72 per unit N) and dry rendered tankage (formerally called cracklings) is held at $1.50 to $1.60 per unit protein, basis Chicago freight.

Sales of sulphur during 1946 were about $61,000,000, which is virtually the same as the all-time high of 1945. Demand from the fertilizer industry continues high, although some industrial demands have declined.

CASE HISTORY No. 11

One in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON
(Per Ton)

	Burlap Bags	100-lb. Paper Bag
Container cost	$2.00	$ .90
Labor cost	.56	.18
Total container and labor cost	$2.56	$1.16
Saving per ton, paper over fabric		$1.40

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER ✓
CHEMICALS	FOOD
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR
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ST. REGIS BAG PACKAGING SYSTEMS are made in a variety of capacities, speeds, and manpower requirements to suit specific products and plant layouts. Machines are available in types to meet the special characteristics of a wide range of products, with filling speeds as high as twenty-four 100-lb. bags per minute.

They struck it rich by changing to a

ST. REGIS PACKAGING SYSTEM

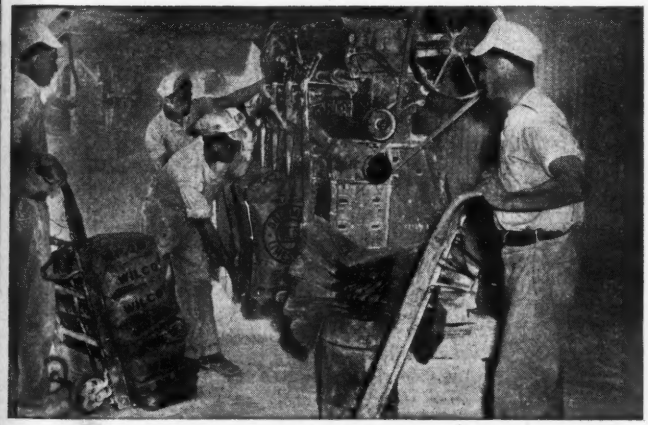
Surveying its packaging costs with a critical eye, a limestone mining company dug deeper into the facts and uncovered a rich "find"—considerably lower packaging costs and a better container for its product.

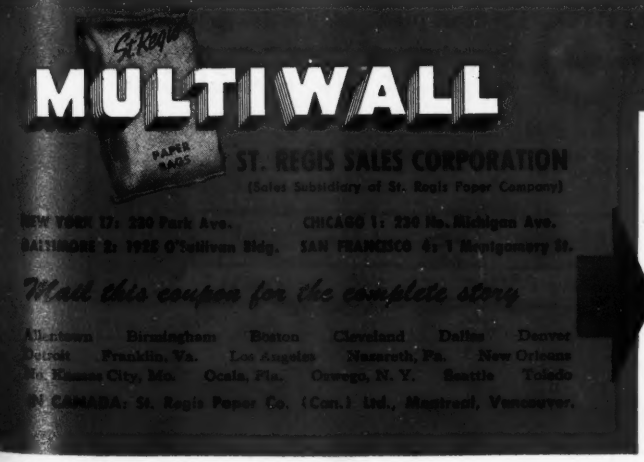
This company—Willingham-Little Stone Company of Atlanta, Ga.—mines and processes dolomitic limestone, which is sold primarily as a neutralizer for acid soils. Formerly the product had been packaged in burlap bags. Then the company changed to a St. Regis Packaging System (packer and multiwall paper valve bags). The economies resulting from this modern packaging system were far beyond expectations:

- Container costs were reduced by 51%; labor costs went down 68%—a total reduction of 55% in packaging costs!
- Packaging output jumped from 15,000 lbs. to 40,000 lbs. per hour—a 166% gain!
- Customers expressed enthusiastic approval of Multiwalls, noting that they virtually eliminated siftage and made a cleaner, easily-handled package.

This "case history" is one of many examples of the outstanding savings made possible by St. Regis Packaging Systems in the rock products, chemical, food, fertilizer industries. For the complete picture story of this efficient operation, mail the coupon to the nearest St. Regis office.

Left: The St. Regis 107-FC packer, which simultaneously fills and weighs 100-lb. multiwall paper valve bags.
Right: Four filling tubes permit uninterrupted packing.





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Without obligation, please send me full details regarding "Case History" No. 11, outlined above.

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COMPANY_____

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International Sales Increase

Net sales of International Minerals and Chemical Corporation for the six months ending December 31, 1946, were $14,958,482, as compared with net sales of $11,277,423 for the corresponding period the previous year, or an increase of 33 per cent, Louis Ware, president of the corporation, announced on January 20th. Net profit for the six months ending December 31, 1946, was $1,206,105, as compared with net profit of $391,417 for the corresponding period in 1945. In making the announcement, Mr. Ware said that operations of the company are continuing at capacity; that the plant food business is seasonal and this winter the shipment of fertilizers has been unusually early.

Potash Control Not Yet Lifted

The Civilian Production Administration has announced that control of potash distribution will be continued at least until fertilizer manufacturers have been able to arrange firm contracts to cover in full their allocations covering the period June, 1946, through March, 1947.

CPA states that the tentative decision to revoke, as soon as possible, Schedule 120 to Order M–300, which provides for the allocation of potash, is based on the general policy of removing controls rather than on any anticipated improvement in the potash supply. Estimates indicate that the supply of potash (K_2O) for all purposes for the "spot period" of April and May will be approximately 25 per cent less than the amount delivered during the same period last year.

Although the United States has an allocation of 30,403 short tons of potash (K_2O) from France and 26,529 tons from Russian-occupied Germany, CPA reports that investigation indicates no material will be shipped from these sources soon.

Yankee Traders Scarce in Ohio

Buying sugar beets for less than $6 a ton and selling them for $16 or more a ton would seem like a Yankee road to quick fortune; but E. P. Reed, extension agronomist, Ohio State University, says a lot of Ohio farmers have been offered that opportunity and have refused the offer.

Mr. Reed's explanation of this deal in beets is that extra fertilizer plowed down will increase yields at an average cost of less than

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Our plant at Trona, Calif., is operating at capacity to provide supplies of these essential plant foods, and other materials needed in the national effort.

Manufacturers of Three Elephant Borax and Boric Acid

See page 25

A Complete Service

THE strategic factory locations of The American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Bone Ash, Bone Oil, Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus, Phosphoric Acid, Sulphuric Acid, Ammonium Carbonate, Ammonium Fluosilicate, Magnesium Fluosilicate, Potassium Fluosilicate, Phosphorus Pentasulphide, Phosphorus Sesquisulphide (lump), Zinc Fluosilicate, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish and Blood. We mine and sell all grades of Florida Pebble Phosphate Rock.

FACTORIES

Alexandria, Va.
Baltimore, Md.
Buffalo, N. Y.
Carteret, N. J.
Cayce, S. C.
Chambly Canton, Quebec, Can.
Charleston, S. C.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
Greensboro, N. C.
Havana, Cuba
Henderson, N. C.
Montgomery, Ala.
Nat. Stockyards, Ill.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Savannah, Ga.
Searsport, Maine
South Amboy, N. J.
Spartanburg, S. C.
Wilmington, N. C.

The AMERICAN AGRICULTURAL CHEMICAL Co.

50 Church Street, New York 7, N. Y.

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Cleveland, Ohio
Columbia, S. C.
Detroit, Mich.
Greensboro, N. C.
Havana, Cuba
Henderson, N. C.
Houlton, Me.
Laurel, Miss.
Montgomery, Ala.
Montreal, Quebec, Can.
National Stockyards, Ill.
New York, N. Y.
Norfolk, Va.
No. Weymouth, Mass.
Pensacola, Fla.
Pierce, Fla.
Port Hope, Ont., Can.
Savannah, Ga.
Spartanburg, S. C.
Wilmington, N. C.

$6 a ton. Ohio beets brought Ohio growers more than $16 for the 1946 crop and probably will be worth more in 1947, so the extra yield from plowed down fertilizer would bring a profit of $10 per ton.

Field tests on the effect of extra fertilizer for sugar beets were made in Hancock, Paulding, Putnam, and Van Wert counties in 1946. Growers applied an average of 300 pounds of 3–12–12 in the row and plowed down either 8–8–8, 10–6–6, or 20–0–0 in quantities large enough to supply from 50 to 100 pounds of nitrogen per acre.

The cost of 600 pounds of 8–8–8 averaged $12.04 an acre and produced an average increase in yield of 2.2 tons of beets. The 10–6–6 at the rate of 750 pounds per acre cost $15.25 and upped yields an average of 2.6 tons per acre. The 20–0–0 cost $8.55 per acre and produced 1.1 tons more of beets.

Mr. Reed believes beets grown at a contract price are a good anchor in a troubled economic world, and he recommends plowing down extra fertilizer to get the best possible yield per acre. Power machinery for production and harvest have made the beet crop easier to grow, and Ohio has the world's largest continuous area of soil adapted to sugar beet production.

Naftel Joins Pacific Borax Staff

The Pacific Coast Borax Company announces the appointment of James A. Naftel, B.S., M.S., Ph.D., as Agronomist, Southern Division. He was formerly Major, Field Artillery, having entered the service as a 1st Lieutenant, where his activities were varied and covered a period of four years, including combat duty in the Italian Campaign.

Dr. Naftel received his B.S. and M.S. degrees at the Alabama Polytechnic Institute and his degree of Philosophy from the Ohio State University. He was connected with the Florida Agricultural Experiment Station and the Ohio State Agricultural Experiment Service for a number of years and more recently as Associate Professor of Soils at the Alabama Polytechnic Institute.

Dr. Naftel is well equipped to render a specialist's service in the field of agriculture and will make his headqua ters in Auburn, Ala., with offices in the First National Bank Building. He plans to spend a large part of his time in the field, in the development of a research and soil improvement program to ascertain the boron needs of soils in the Southern States.

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If the manufacture and sale of agricultural insecticides would fit in naturally with your present business . . . If you are a reliable, progressive and alert company . . . If you are interested in making a permanent and profitable addition to your present lines . . . Send for full information about The M. G. K. Franchise Plan featuring the nationally advertised Pyrocide* Dust and Multicide* (DDT) Dusts and Sprays.

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"Jay Bee" grinds every grindable fertilizer ingredient, coarse or fine, cool and uniform.
All steel construction—heavy cast iron base. Practically indestructible. Biggest capacity for H.P. used. Handles products with up to 14% grease—30% moisture. Delivers finished products to storage bins without screens or elevators. Sizes and styles from 20 H.P. to 200 H.P. to meet every grinding requirement.
Write for complete details. Please state your grinding requirements.

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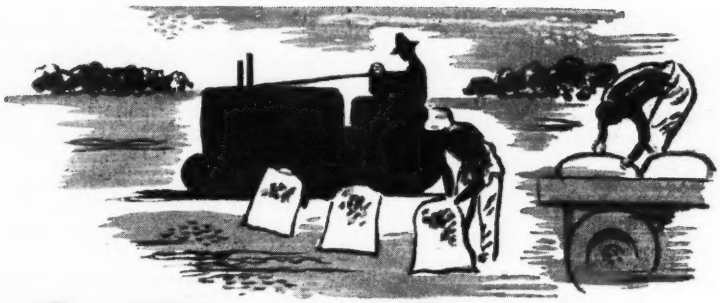

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MINERALS & CHEMICAL CORPORATION

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PHOSPHATE • POTASH • FERTILIZER • CHEMICALS

1946 TAX TAG SALES

(Continued from page 11)

in the United States for 1946 was probably more than 15,000,000 tons.

Tag sales in both the South and the Midwest have been steadily increasing but the rate of increase, based on the 1935–1939 average as 100, has been greater for the Midwest.

December Sales Soar

December tag sales were equivalent to 928,000 tons of fertilizer, an increase of 52 per cent over the 613,000 tons for 1945. Sales in the 11 Southern States amounted to 734,000 tons, an increase of 46 per cent over 1945, while the 5 Midwestern States had total sales equivalent to 195,000 tons, which was 76 per cent greater than sales for the previous year. December sales in the last three years in the South averaged 8.5 per cent of the annual sales while in the three pre-war years, 1937-1939, December sales averaged only 4 per cent. In the 5 Midwestern States, December sales in the last three years averaged 9.8 per cent of the annual sales, whereas, in the pre-war period they averaged less than 1 per cent. Early buying of fertilizer, no doubt, was largely responsible for this shift.

November Superphosphate

The total output of superphosphate, figured on the basis of 18 per cent A. P. A., dropped slightly to 750,390 tons during November, according to U. S. Bureau of Census figures. October production was 754,215 tons while November, 1945, showed 718,023 tons. Normal superphosphate and base goods both showed a decline while the concentrated grade increased about 2,500 tons. Shipments of both normal and concentrated were lower during November. Stocks on hand at the end of the month showed a marked increase but were still below the figures for November 30, 1945.

	Normal 18% A. P. A.	Concentrated 45% A. P. A.	Base Goods 18% A. P. A.
Production			
November, 1946....	667,759	31,633	3,548
October, 1946.....	677,027	29,072	4,508
November, 1945....	651,449	24,893	4,341
Shipments and Used n Producing Plants			
November, 1946....	632,202	23,989	2,303
October, 1946.....	728,635	30,141	2,097
November, 1945....	674,466	21,370	1,438
Stocks on Hand			
November 30, 1946..	584,296	56,167	11,845
October 31, 1946....	537,542	47,908	10,600
November 30, 1945..	802,765	33,602	11,771

ANNUAL FERTILIZER TAX TAG SALES

Compiled by The National Fertilizer Association
(Short Tons)

	5-Yr. Aver. 1935–1939	1942	1943	1944	1945	1946	% of 1945
Virginia	405,742	420,668	487,038	515,578	594,829	669,437	113
North Carolina	1,119,246	1,243,612	1,414,454	1,369,751	1,512,013	1,706,582	113
South Carolina	670,205	698,704	890,493	799,083	822,875	943,550	115
Georgia	725,287	852,765	1,083,488	1,039,679	1,105,564	1,135,685	103
Florida	512,826	589,610	719,290	824,500	908,651	1,061,073	117
Alabama	522,062	574,150	780,050	674,400	722,500	898,650	124
Tennessee	122,744	174,298	230,818	271,545	277,090	331,265	120
Arkansas	59,832	140,458	182,865	131,083	126,650	171,250	135
Louisiana	135,197	173,241	214,768	216,145	239,560	258,268	108
Texas	79,251	133,974	186,510	204,509	229,828	376,942	164
Oklahoma	7,029	8,752	21,488	20,708	25,072	58,743	234
Total, South	4,359,421	5,010,232	6,211,262	6,067,081	6,564,632	7,611,445	116
Indiana	244,429	436,679	496,380	480,421	548,295	682,366	124
Illinois	38,909	82,526	111,315	185,565	257,014	311,603	121
Kentucky	101,990	146,420	164,038	246,119	282,134	328,881	117
Missouri	74,704	70,937	95,592	146,504	160,024	280,731	175
Kansas	13,240	11,415	16,324	38,521	38,145	61,353	161
Total, Midwest	473,272	747,977	883,649	1,097,130	1,285,612	1,664,934	130
Grand Total	4,832,693	5,758,209	7,094,911	7,164,211	7,850,244	9,276,379	118
Total United States Fertilizer Consumption*	7,338,000	9,949,000	11,463,000	12,055,000	13,202,000	.....	...

*Including fertilizer distributed by Government agencies.

ALEX. M. McIVER & SON

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Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION

122 East 42nd ST., NEW YORK CITY

Pioneer Producers of Muriate of Potash in America

See Page 30

TRENDS IN THE USE OF MAJOR PLANT FOODS

(Continued from page 10)

and with less dependence on nearby consumption than is essential for the ordinary analysis material. Table VII summarizes the volume of superphosphates we could produce and have produced. In spite of the reverses which the war brought to both types of material with their emphasis on the high-analysis plants, there is a steady although unspectacular growth of the proportion of phosphates both potentially and actually in the high-analysis form.

Trends in Distribution by Government

Phosphates have predominated in government distribution. The Tennessee Valley Authority began distribution in 1935 with approximately 2,000 tons and reached a volume of 42,000 tons in 1944.

TABLE VIII

PLANT FOOD CONTENT OF FERTILIZERS DISTRIBUTED

Year	N	P_2O_5	K_2O	Total
1938–1939	3.0	12.0	5.5	20.5
1939–1940	3.2	12.6	5.7	21.5
1940–1941	3.3	13.1	6.3	22.7
1941–1942	2.9	12.8	6.5	22.2
1942–1943	2.7	12.1	7.0	21.8

The Agricultural Adjustment Agency began distribution in 1937 with 25,000 tons reaching a volume of about 1,200,000 tons in 1942 and receding to 860,000 tons in 1943. In 1943, the AAA-distributed fertilizer is reported to contain 374,000 tons of phosphoric acid and 41,000 tons of K_2O. In 1944, that agency also initiated distribution of a few hundred tons of nitrogen in the State of Maine. And now "grants-in-aid" are paid in several states for all three major nutrients as well as land-liming materials.

Distribution by Cooperatives

Doctor J. G. Knapp reports in a Farm Credit Administration bulletin published in May, 1945, that farmer cooperatives distributed 9 per cent of the national fertilizer tonnage, varying from 5 per cent in the Southeast to 20 per cent in the Northeast (Table IX). The only significant trend shown in that publication in the cooperatives ratio of major nutrients is upward in potash ending with approximately a 3–12–7 in 1943 as compared to other distribution averaging close to 4–10–6. You will note that in concentration the cooperatives exceed other channels of distribution by a contrast of 22 units to 20.

TABLE IX

PLANT FOOD CONTENT OF COOPERATIVE AND OTHER FERTILIZER COMPARED—1942–1943

Nutrients	Per Cent Cooperatives	Per Cent Others
Nitrogen	2.7	4.22
Phosphoric Acid	12.1	9.96
Potash	7.0	6.06
Total	21.8	20.24

TABLE X

FERTILIZER USED ON PRINCIPAL CROPS 1929, 1938 AND 1942[1]

Crop	Per Cent of Total Consumption 1929	1938	1942
Corn	20.7	21.6	22.0
Cotton	28.0	19.3	14.6
Small Grains	13.8	14.3	14.1
Vegetables	5.3	4.3	8.9
Potatoes	8.5	7.4	7.1
Hay	2.1	4.1	7.1
Pasture	([2])	2.1	5.8
Fruits	4.3	4.5	6.7
Tobacco	6.8	6.7	5.3
Sweet Potatoes	1.4	1.8	1.5
Other Crops	9.1	13.9	6.9
Total	100.0	100.0	100.0

[1] From the *Fertilizer Review*, July-September, 1943.
[2] No estimate, very low.

Trends by Crops

Cotton, which in 1929 received 28 per cent of the fertilizer used in the United States, had decreased to 15 per cent by 1942 and yielded first place to corn which increased during the same period from 21 to 22 per cent. Hay and pasture increased from 6 to 15 per cent of the total from 1938 to 1942, and was only 2 per cent in 1929. The increases in fertilizer use on fruits, vegetables,

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SPENSOL A	65.0	21.7	13.3	40.6	11.36	29.24
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and small grains are well worth the attention of both agronomists and the industry.

Trends in Secondary and Minor Nutrients

Certainly calcium and magnesium, and occasionally sulphur, become limiting factors in nutrient needs under some conditions, in addition to their roles in affecting the acidity of soils. Increased liming is improving the calcium status of soils. Wider use of solomite (magnesian limestone) is helping the magnesium needs, together with other more active magnesium carriers in some mixed feetilizers. Most fertilizer mixtures contain enough sulphur to remove that element from the troublesome class.

Boron deficiency on some soils and for certain vegetable crops as well as for some legumes is increasingly recognized as a limiting factor by its inclusion in mixtures for specific purposes. Two schools of thought seem to have developed in its use. One follows the practice of including borax in small amounts in all mixtures. The other uses borax in larger amounts in mixtures for specific purposes only. I prefer the latter practice both because of the toxic properties of borax if used carelessly and because I am as yet not convinced that we are justified in curing our nutrient ills by a gun-shot prescription, although I prefer a preventive to a post-mortem approach.

Recently cobalt has become important as an element in certain ruminant-feeding areas. At present cobaltous sulphate is being used as a drench applied to feed. How we should or may apply that element in fertilizers is yet to be determined. In any case, the developments concerning cobalt and other rare elements open up new areas of fertilizer use in terms of removing elusive first limiting factors which clear the tracks for more economic use of the major plant nutrients.

Organic Matter

None of us intend to ignore the importance of soil tilth in fertilizer use. Organic matter, aeration, moisture balance are all so important that I shall stress them here by brevity of treatment in our search for major nutrient efficiency. Here is a wide field for the soil physicists to develop with our interested approval and cooperation. Crops, like human beings, must breathe and be refreshed with moisture and sunlight if they are to thrive on the other dynamic factors which feed them and manufacture their chlorophyl and other building blocks.

A Look Ahead

No crystal ball is required to discern some of the major nutrient patterns which lie ahead. The historical patterns will project itself into the future, not statically we may be sure, but dynamically. There will be a further narrowing of the ratio of phosphoric acid to nitrogen and potash. Pioneer areas will, as in the past, begin with phosphates and progress toward the 1–1–1 ratio as the agriculture intensifies, and the minds in them grow. Soil, rainfall, types of farming, returns per acre, costs for nutrients, and the secondary as well as minor elements will all have their effect on major nutrient use. But so also will ideas and the proof of ideas in the field. Potash will increase in ratio steadily; nitrogen will climb in some regions and decline in ratio in others. Good management needed on the farm in utilizing the feed crops produced with heavy nitrogen applications makes the job of sound nitrogen promotion a most challenging one. Superphosphate producers will learn to understand that a decreased phosphate ratio need not mean less volume and that if it does the welfare of users ranks ahead of manufacturers' desires. To their credit, more superphosphate producers than we may believe have such an attitude already and are wisely working to develop uses where potential markets are incompletely tapped.

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the number of pounds of raw material for a desired per cent. of plant food in a ton of mixed goods—or find what per cent. of a certain plant food in a ton of fertilizer produced by a specific quantity of raw materials.

No mathematical calculations are necessary. You can find the figures in a few seconds with the aid of

Adams' Improved Pocket Formula Rule

A Great Convenience for the Manufacturer of High Analysis Goods

To make clearer its use, answers to such problems as the following can be quickly obtained:

How much sulphate of ammonia, containing 20 per cent. of nitrogen, would be needed to give 4½ per cent. nitrogen in the finished product?

Seven hundred and fifty pounds of tankage, containing 8 per cent. phosphoric acid are being used in a mixture. What per cent. of phosphoric acid will this supply in the finished goods?

Should the Adams' Formula Rule become soiled from handling, it may be readily cleaned with a damp cloth.

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Various estimates have been made of the quantity of commercial fertilizer that farmers will buy. Other estimates have been made of the amount we should use nationally. Some of these estimates indicate a possible need for doubling our present fertilizer use. That would be four times the amount we averaged to use during the five-year period, 1935 to 1939. Such goals serve a constructive purpose in stimulating thought. I like them because they do that. But I am sure we should not take such estimates literally. Certainly we can afford to use greater quantities of fertilizer if they are used effectively. As we increase the use of fertilizer further, the need for better management to accompany such use becomes even more important than with our present volume. Thus, we should proceed gradually and I feel sure we will in building still greater fertilizer use.

I suggest that the greatest opportunities ahead are in those fields of ideas and their promotion which those of us in industry and agronomy may both attack with vigor and imagination. (1) The relation of fertilizers to improved strains of crops, (2) the expansion of feed crop fertilization, (3) the fertilization of rotations in better management of soils, (4) the expansion of soil and plant tissue testing in their sound place toward more economic fertilization, (5) cleaning house of the unnecessarily dilute fertilizer grades still cluttering up the corners of the fertilizer industry's back kitchen, (6) learning a lot more about the secondary and minor elements and their use, (7) the development of new and better fertilizer application machinery to handle tomorrow's fertilizers, and (8) learning how to measure and affect favorably that elusive but important factor of soil tilth, are but a few of the "Ideas Unlimited" which lie ahead. As we tackle these and other problems, we can be sure that not only will others present themselves but that we'll have the stimulating experience of learning that the answers are sometimes simple and sometimes complex, but frequently obvious when we know the why as well as the how.

Regulations

Control laws affecting fertilizers were, I believe, instituted to protect fertilizer consumers from fraud. None of us, I am sure, object to safeguards. Nor have we objected to most of the wartime restrictions of the type included in food production orders.

Custom built up some ridiculously complex lists of fertilizer grades. Most of us approve reasonably practical limitations of grades. I do not believe we need mandatory restriction to maintain some sense in the ratios and grades of major plant foods to be offered for use. I urge that among the trends in major nutrients we do not twist our control laws into mandatory limitations. Industry will welcome the agronomists' recommendations. Most fertilizers offered will in the future follow such recommendations. Agronomy is not yet an exact science. In our effort to establish reasonable order, let's not rip over the rope of standardization and stifle the progressive minorities. There are an increasing number of top executives and agronomists in the fertilizer industry who have the courage and the sense to limit their fertilizer offerings to a group which their factories can manufacture and distribute with economy. The day is gone when small variations in grade or ratio can or will be produced by most of the industry. But regimenting by regulation is hardly an acceptable substitute for constructive education or good business judgment.

I particularly hope that, unlike the custom in recent years in some sections, any recommendations made by agronomists will include an emphasis on higher analyses of suggested minimum grades. Only one or two groups of states even mentioned such possible multiples during the war. Let's open the gate for such progressive moves as we settle down to the interesting tasks to come.

Now It's Bus-to-Portal

It was reported to a Senate committee that a C. I. O. union at the plant of the Potash Company of America at Carlsbad, N. M., is seeking pay for the 35-minute bus ride from town to the mine and refinery. It is claimed that the workers "expend mental and physical energy for the company" during the trip. F. O. Davis, treasurer of the company, stated that the workers can nap or read on the ride and "they usually do."

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For an Alphabetical List of all the Advertisers, see page 33

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International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Virginia-Carolina Chemical Corp., Richmond, Va.

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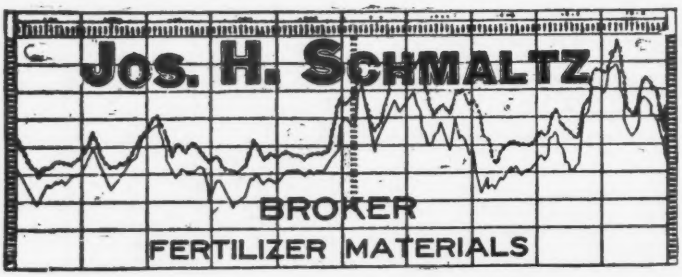

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